NASA PURCHASE REQUEST R-108, AMENDMENT NO. 1

rec'd 5/21/65

QUARTERLY PROGRESS REPORT NO. 3

1 JANUARY 1965 - 31 MARCH 1965

LUNAR CHARTING PROGRAM

Aeronautical Chart and Information Center
United States Air Force
Second and Arsenal
St. Louis, Missouri 63118

SUBJECT: Quarterly Progress Report No. 3
1 January 1965 - 31 March 1965

NASA Defense Purchase Request R-108, Amendment No. 1
Date of Performance: 1 July 1964 to 30 June 1965
Amount: $350,000

1. GENERAL

During this reporting period concentrated effort was applied toward the LAC-AIC Programs with the objective of making up delays caused by Ranger VII charting. ACIC plans to complete a total of 6 LACs and 4 AICs in FY 65, thereby meeting its commitments to NASA.

The fourth DIA-AMS-ACIC Conference on Lunar Control was held at ACIC on 26 January 1965. ACIC presented a critique on the AMS-64 Lunar Control Report.

On 29 January 1965, Colonel Arthur T. Strickland, Hq NASA, Mr. James H. Sasser and Mr. John E. Dornbach, Manned Spacecraft Center, visited ACIC for exploratory discussions in the area of Lunar Photometry.

On 11 March 1965, Colonel Strickland and Mr. Sasser visited the ACIC Lowell Office in Flagstaff, Arizona, for a briefing on progress of the AIC Program.

2. STATEMENT OF WORK: Acquisition of Lunar Photography

ACTION: During this reporting period 2000, 9 x 9" lunar negatives on high resolution stable film and 24, 9 x 9" glass plate negatives were received from Pic du Midi through Air Force Contract AF 61(052)-829 with the University of Manchester, England. The films were evaluated and duplicate copies of 20 different librations were furnished MSC, Houston, Texas, and USGS Astrogeology Branch, Flagstaff, Arizona. Photography received was of continuing high quality and filled some of the existing age/illumination voids in ACIC photographic holdings.

210, 70 mm sequential photographs were received through Air Force Contract AF 23(601)-4010 with Lockheed Aircraft, Burbank, California. A total of 9,667 photographs has been received to date and used in the shadow measurement program at ACIC. The contract was terminated, effective 31 January 1965, because it was determined that the continuing contract at Pic du Midi would meet ACIC's anticipated future requirements for lunar photography.

The camera developed under Contract AF 23(601)-12685 and planned for installation at Pic du Midi Observatory in February 1965, has been delayed due to some required changes resulting from environmental testing at Wright-Patterson Air Force Base. Installation is now planned for June 1965.

3. STATEMENT OF WORK: Visual Telescopic Observations - Lowell Observatory

ACTION: During the reporting period, Modification Number 5 to Contract AF 23(601)-3889 was made for observation of an additional 127,000 square miles at a cost of $5700. Additional expenditures of $2205 for ACIC Lowell office equipment were made and $2250 funded for equipment maintenance and repair. An additional $2083 will be required for changes to Film Viewer being constructed under AF 23(601)-4053 Contract with the Systems Development Corporation, Burbank, California.

190,000 square miles of lunar surface compilation were completed during the reporting period. Observations and relief renditions were made for LACs 38, 42 and 96 and AICs 58C, 58D and 77A.

A third Scientific Illustrator was added to ACIC Lowell Observatory staff on 15 February.

Binocular eyepieces have been fabricated and installed on both the 20-inch and 24-inch Lowell refractors, which have increased observer efficiency by a factor of 2. The binocular affords better eye-relief and, therefore, less fatigue. Plans are being made to provide both refractors and their guide telescopes with common adaptors so that the same observational equipment can be used on either telescope.

4. STATEMENT OF WORK: Mensuration of Lunar Photography

ACTION: Through Supplemental Agreement No. 1 to Contract AF 61(052)-829, made during the last reporting period with the University of Manchester, England, the necessary inventory of relative heights for scheduled FY 66 production will be supplied. The effort is directed toward supplying derived elevations through the measurement of shadow lengths of lunar photographs taken at Pic du Midi. Shadow measurements on a comparator have been made covering LAC 98, and work is proceeding on LAC 44 and 92. LAC 98 results will be received in ACIC as soon as computer reductions are completed.

5. STATEMENT OF WORK: Modification of Micro-Analyzer

ACTION: The Engineering Change Proposal No. 1 to Contract AF 23(657)-13480 was accepted on 10 March 1965 at a cost of $51,289.75. There has been a prior transfer of funds from ACIC to Wright-Patterson AFB of $54,000.00, of which $2,710.25 was deobligated. The modifications, performed by Data Corporation of Dayton, Ohio, are to be completed within 180 days after the

date of the ECP, with an additional 45 days to be allowed for an operational checkout of the equipment.

During the reporting period, the Micro-Analyzer was utilized in the following projects:

a. Sensitometry of photographs in Pic du Midi lunar photographic programs, comparing the emulsion response curve for exposures made with varying duration.

b. Scans of control features on a Lick Observatory photograph used in AMS 1964 lunar control solution.

c. Densitometry of lunar photographs for shadow measurements in LAC 97 region.

d. Studies of modulation transfer of photographic emulsions as a factor in lunar shadow measurement.

6. ACCOMPLISHMENTS:

LAC Charts - LACs 38 and 42 have been released for printing. The remaining LAC Charts scheduled for FY 65 production have been brought to the following percentage of completion:

LAC 96	84%
LAC 97	75%
LAC 43	65%

AIC Charts - The four 1:500,000 charts scheduled for FY 65 production are in the latter stages of completion. AIC 58D has been released to Negative Preparation Section for engraving. Proof will be submitted to MSC upon completion for approval before publication. The remaining charts are in the following percentage of completion:

AIC 58C	80%
AIC 77A	70%
AIC 60D	68%

Selenodetic Control - ACIC Technical Paper #15, which contains results of Group I and Group II solutions of the ACIC primary Lunar Control, has been delayed in publication in order to secure complete validation of the ACIC system by recognized authorities in the field. Publication will be made during the next quarter.

The Group III solution is currently in work and scheduled for completion in May 1965. The final Group IV solution will be accomplished upon the conclusion of Group III.

Control extensions have been made using the results of the first two groups as a primary net. The extensions, using phase photography to take advantage of the increased contrast, have been made for three LAC and four AIC charts. Approximately 30 secondary control positions have been computed in each of the chart areas.